

CLAIMS

1. Apparatus for non-invasively (non-contact) monitoring the cellular bioactivities in a body, said apparatus comprising:

- 5 - High frequency (HF) power oscillator means for producing stable sinusoidal HF electromagnetic (EM) energy; and
- Balanced type antenna means for introducing the EM energy being produced by the said oscillator
- 10 into the region of the body being monitored; and
- Matching network means for matching the output impedance of the said oscillator means with the characteristic impedance of the said region of the body being monitored; and
- 15 - Ultra narrow band pass filter (BPF) means for reducing the internal random noises which contaminates the said produced EM energy; and
- Bi-directional coupler connected in series within transmission line means for instant sampling the
- 20 internal forward and reflected power values that only occurred inside the said transmission line due to the transmission lines match and mismatch phenomena; and
- Dual high pass filters (HPF) means for filtering
- 25 the said forward and reflected power values means for passing only the variable voltages which contains the useful indications about the Impedance match and mismatch variations

- between the said region of the body being monitored and the said power oscillator; and
- Differential amplifier means for differentially combining the said extracted variable voltages means for producing an output voltage that contains an indications about the cells bioactivity being monitored; and
 - Analogue divider means for dividing the said resulted differential voltage to at least one output that maintaining the same characteristics as the undivided input; and
 - Active filter(s) means for separating specific frequencies bandwidth by band(s) pass and / or band(s) reject filtering the said divided voltage(s) means for extracting different kinds of cells bioactivities.
 - Output amplifier(s) means for amplifying the said actively filtered voltage to the needed level sufficient to drive the following analytical / indicator circuits
2. A method for non-invasively (non-contact) monitoring cellular bioactivities in a body by means of monitoring impedance variations that occur due to the movements of ionized particles across the cells membrane and/or by means of monitoring the impedance variations that occur due to the cellular movement or flow within the body, and/or by means of monitoring changes in the cellular impedance which occur due to differential

concentration of the ionized particles on both sides of the cellular membrane, the method comprising:

- 5 - Directing EMW being produced by HF power oscillator to the region of the body being monitored by Balanced type antenna; and
- Matching the output impedance of the said HF power oscillator and the characteristic impedance of the said region of the body being monitored; and
- 10 - Ultra narrow band pass filtering means for purifying the produced EMW; and
- Instant sampling, via a Bi-directional coupler, of the forward and reflected power values which occur inside transmission line due to the transmission lines match and mismatch phenomena; and
- 15 - High pass filtering the said forward and reflected power values means for passing only the variable voltages that contain indications concerning the Impedance match and mismatch variations between the said region of the body being monitored with the said oscillator ; and
- 20 - Differentially combining the said variable voltages means to produce differential output voltage that contain indications pertaining to the cellular bioactivity being monitored; and
- 25 - Separating specific frequency bandwidths by band(s) pass and/or band(s) reject filtering of the

said differential voltage means to extract data relating to specific types of cellular bioactivities

3. A device comprising:

- 5 - HF oscillator for producing EM-waves for non-invasively (non-contact) monitoring the cells bioactivity, the said oscillator possesses a power range from 1 to 100 milli-watt, and a frequency range from 1 to 300 MHz; and
- 10 - Balanced type antenna comprised of dual insulated parallel or opposite or overlapped metal sheets or wires, the said antenna being adapted for any location on the region of the body containing the collection of cells to be monitored; and
- 15 - An impedance matching network means for matching the output impedance of the HF oscillator with the characteristic impedance of the region of the body being monitored; and
- 20 - Means for extracting variable voltages from the forward and reflected transmission line voltages to produce voltages which provide indication data about the impedance variations of the region of the body being monitored; and
- 25 - Means for differentially combining the said extracted variable voltages to obtain a differential signal which is indicative of cellular bioactivities within the region of the body being monitored; and

- Means for separating the said differential signal via frequency bandwidth means to ascertain specific cells bioactivity; and
 - Means for amplifying the said separated signal to a level that can drive the output analytical or indicator circuits.
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4. A device as claimed in claim 3, wherein said device is adapted for non-contact monitoring the body hemodynamics, means for monitoring the vital activities of the heart and / or the lung and / or the vascular system.
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5. A device as claimed in claim 3, wherein said device is adapted for non-contact monitoring the brain bioactivities.
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6. A device as claimed in claim 3, wherein said device is adapted for non-contact monitoring the bioactivities of the central and / or peripheral nervous system.
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7. A device as claimed in claim 3, wherein said device is adapted for non-contact monitoring vital sign activities of fetal organs.
8. A device as claimed in claim 3, wherein said device is adapted for non-contact monitoring insect bioactivities.